Exploring Forces

Standard difficulty · 20 questions · 40 marks · Time: 36 minutes

Name: _____ Date: _____ Score: ____ / 40

Show your working for Sections B and C. Answers are on the last page — try every question first!

Section A — Choose the correct answer — 8 × 1 = 8 marks

1. A force is a:

(a) type of matter **(b)** measure of time

(c) kind of energy **(d)** push or pull

2. Which force is at work in ring magnets floating on a pencil?

(a) magnetic **(b)** buoyant **(c)** muscular **(d)** friction

3. Which of these is a NON-CONTACT force?

(a) the force in lifting a school bag

(b) the force in a bullock pulling a cart

(c) the force in brakes stopping a bicycle

(d) the force in a ball thrown up coming back down

4. A 1 kg mass weighs about 9 N on Venus. About how much does a 2 kg mass weigh there?

(a) 18 N **(b)** 2 N **(c)** 27 N **(d)** 20 N

5. A student has a mass of 45 kg on the Earth. What is the student's MASS on Mars?

(a) 45 kg **(b)** 7.5 kg **(c)** 17.1 kg **(d)** 450 kg

6. A spring balance reads from 0 to 20 N and has 10 small divisions for every 1 N. What is its least count?

(a) 2 N **(b)** 10 N **(c)** 1 N **(d)** 0.1 N

7. A spring balance has 2 divisions for every 1 N. The pointer stops 7 divisions below zero. What force does it show?

(a) 3.5 N **(b)** 4.5 N **(c)** 7 N **(d)** 14 N

8. Which of these is a CONTACT force?

(a) muscular force **(b)** magnetic force

(c) electrostatic force **(d)** gravitational force

Section B — Short answer — 8 × 2 = 16 marks

9. What is force?

10. Name the force (gravitational, magnetic, electrostatic, friction or muscular): (a) a ball thrown up coming back down (b) brakes stopping a bicycle

11. Is it a "contact" or "non-contact" force? (a) a bullock pulling a cart (b) ring magnets floating on a pencil

12. Using the book's values (1 kg weighs about 10 N on the Earth and 1.6 N on the Moon), find the weight of a 32 kg box on the Earth and on the Moon.

13. A spring balance has 10 divisions per newton. What is its least count, and what does it read when the pointer is 27 divisions down?

14. Is friction useful or a nuisance in each, and why? (a) writing with a pencil (b) heat in moving machine parts

15. A ball rolled down a ramp travels 66 cm on a smooth floor and 40 cm on a carpet. How much farther did it go on the floor? Why?

16. A person has a mass of 52 kg. What would be their mass on the Moon, and about what would they weigh there (1 kg weighs about 1.6 N on the Moon)?

Section C — Word problems — 4 × 4 = 16 marks

17. Explain contact and non-contact forces with two examples each.

18. A 26 kg rover is sent to the Moon and another to Venus. (a) What is each rover's mass there? (b) Using the book's table, about how much does each weigh there? (c) Why are mass and weight different?

19. Name the force in each and say whether it is contact or non-contact: ring magnets floating on a pencil; a magnet pulling an iron pin; an apple falling from a tree; a comb pulling up dry hair after combing.

20. A spring balance with 10 divisions per newton reads 38 divisions for a stone in air and 34 divisions when the stone is in water. (a) What are the two readings in newtons? (b) Why is the reading less in water? (c) How big is the upward force of the water?

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Answer key

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Q	Answer	Working
1	**(d) push or pull**	—
2	**(a) magnetic**	—
3	**(d) the force in a ball thrown up coming back down**	—
4	**(a) 18 N**	2 × 9 = 18
5	**(a) 45 kg**	mass does not change from place to place
6	**(d) 0.1 N**	1 ÷ 10 = 0.1
7	**(a) 3.5 N**	7 ÷ 2 = 3.5
8	**(a) muscular force**	—
9	**A push or a pull that results from two objects interacting.**	—
10	**(a) gravitational (b) friction**	—
11	**(a) contact (b) non-contact**	—
12	**320 N; 51.2 N**	32 × 10; 32 × 1.6
13	**0.1 N; 2.7 N**	1 ÷ 10; 27 ÷ 10
14	**(a) useful (b) harmful**	—
15	**26 cm; the carpet gives more friction**	66 − 40
16	**52 kg; about 83.2 N**	mass stays 52 kg; 52 × 1.6
17	**Contact forces act only when objects touch: muscular force when we push a box, friction when a rolling ball slows. Non-contact forces act from a distance: gravity pulls a falling apple, a magnet attracts iron, and a charged comb attracts paper bits.**	—
18	**(a) 26 kg on both (b) the Moon: about 41.6 N; Venus: about 234 N (c) Mass is the amount of matter and does not change; weight is the pull of gravity, which differs from place to place.**	—
19	**ring magnets floating on a pencil: magnetic (non-contact); a magnet pulling an iron pin: magnetic (non-contact); an apple falling from a tree: gravitational (non-contact); a comb pulling up dry hair after combing: electrostatic (non-contact).**	—

Q	Answer	Working
20	**(a) 3.8 N and 3.4 N (b) The water pushes the stone up (buoyant force). (c) 0.4 N**	—